



1999

Games on the 'Net (presentation)

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Games on the 'Net

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Outline

Games and interactive entertainment (IE) on the 'Net

- ***What do they look like? How do people interact with these systems?***

Technical requirements (latency, bandwidth, graphics, software ...)

Research & Development required

From Internet to “The ‘Net”

‘Net -- > Internet of the Future for the purposes of this talk (Internet 2, NGI, ...)

I want to distinguish this from the Internet we have now, most often characterized as the World Wide Wait ...

- *Think Evolution. We are going to evolve there from today's Internet, with lots of R&D work & capital ...*



In the future we will have ...

Let's make some assumptions.

- ***Infinite bandwidth to the home.***
- ***Infinite 3D graphics capability & computing power in the home.***
- ***Affordable for the home.***

If this were so, what would our games and IE systems be?

The logo for NPSNET, featuring the text "NPSNET" in a bold, black, sans-serif font inside a red, horizontally-oriented oval with a slight 3D effect.

Scenarios derived from today - best we can do ...

- *Interactive TV -chattin'withJulie*ie...**
- *3D Avatar Chat & RPG - persistent worlds, GangsOnline, SaveThePrincess, SlayTheBeast, FullProfessor ...*
- *Quake 2007 - "smell the blood" (the Nth version of this very special shooter ...)*

If this were so, what would our games and IE systems be?

The logo for NPSNET, featuring the text "NPSNET" in a bold, black, sans-serif font inside a red, horizontally-oriented oval with a slight 3D effect.

- *Shooters 2013!* - these will always be with us!
- *ExtremeSports 2015!* - the word *Extreme* is rapidly becoming a cliché but what the heck!
- *MartialArts Forever!*! - at least its not MaritalArts.
- *VR Sex* - the technology driver ...

Interactive TV

***INTERACTIVITY - chat,
change story direction,
body tracking to reach
out and touch
something/somebody, say
something, be a part of
something ...***

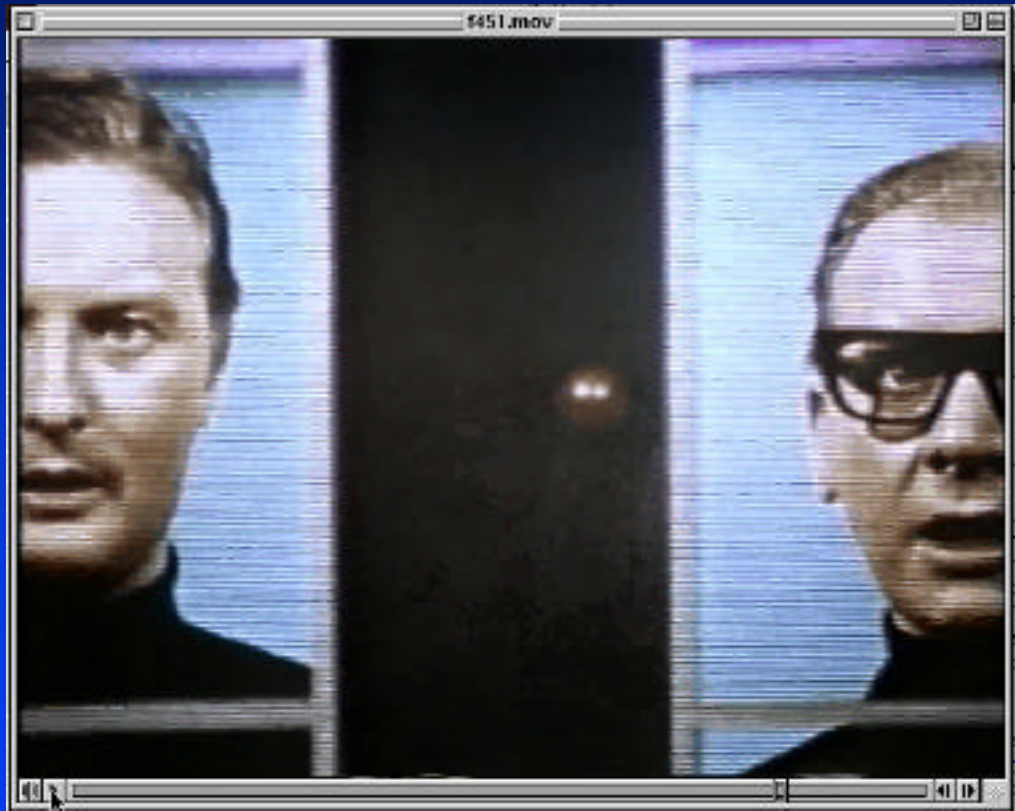


Interactive TV

GRAPHICS -
*composited video or
just plain video*

Two-way audio.

- *Maybe Interactive TV understands what we say back & changes the story autonomously?*



Interactive TV

'Net - to carry the streams ...

- ***Video/audio stream and entity information to the player.***
- ***Entity interactions and video/audio stream back.***



Interactive TV

EXPERIENCE - is this individual or group?

- *How did I do with respect to people in the room with me?*
- *How did my friends perceive I did in this experience?*
- *Want both ...*



3D Avatar Chat & RPG

INTERACTIVITY - We want to have a 3D avatar, with animated face and we want to chat with others or with autonomous characters over the 'Net ...



3D Avatar Chat & RPG



GRAPHICS - *Our graphics are going to have to be very good.*

- *We want to see the lips move on the character to whom we are speaking ...*
- *This has to be synched with the sound ...*
- *Movements cannot lag.*



3D Avatar Chat & RPG

'Net - the 'Net is going to have to let us chat/play with people who are located just about anywhere ...

- *We have audio and entity streams transiting the net.*



3D Avatar Chat & RPG



EXPERIENCE - We are going to be a knight fighting the giant, our body motions tracked.



3D Avatar Chat & RPG

EXPERIENCE - we are going to find ourselves talking to Lara Croft of TombRaider & she's going to answer back.

- ***We are going to feel as if we are interacting with Lara a....***



Quake 2007



***INTERACTIVITY -
We are going to go
into a dark, 3D
world and fight
monsters off the
'Net.***

- ***We're going to hear
them breathe and
we're going to hear
them die.***



Our 3D
worlds
will be
rich in
detail,
with both
lighting
and
texturing
and
geometry
...



Quake 2007

GRAPHICS - Our 3D VE will have fully articulated monsters, monsters steered by body-suited, armed opponents or computed autonomously.

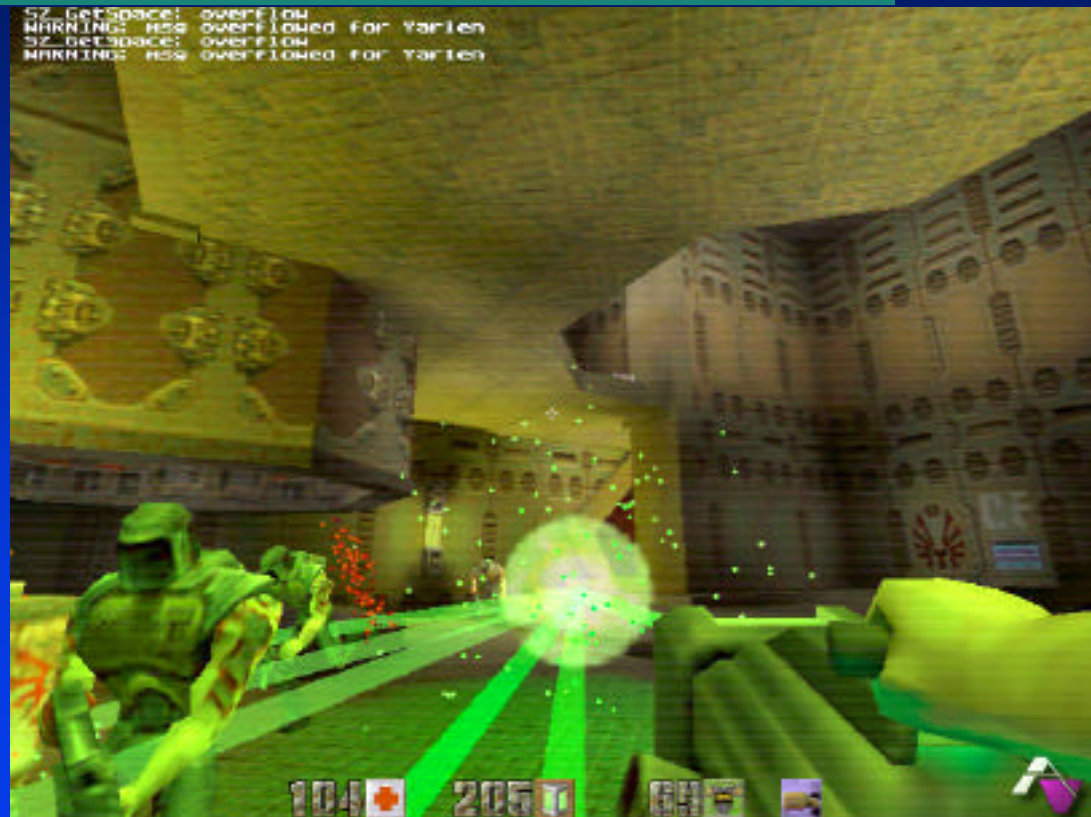


Quake 2007

NPSNET

'Net - We are going to team with distant friends to accomplish our missions.

- We will have an audio stream and an entity stream.***



Quake 2007

NPSNET

EXPERIENCE -
We will feel as if
we are in the
Quake-2007 VE.

- ***Our roommates will***
be able to smell
the fear and us
the blood ...



Shooters 2013!

INTERACTIVITY - Our body motions will be tracked in our game cell unit, our fist will clench our weapon, our avatar may be altogether different from our corporeal norm ...



Final Fantasy VII x "Hollywood Digital Arts" = "Parasite Eve"

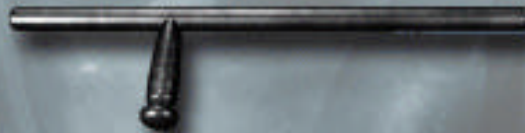
FEATURES WEAPONS/ARMOR

battle system
monsters
weapons/armor

HANDGUN



CLUB



SHOTGUN



PROTECTOR



VEST



ARMOR



SUIT

We will be well-armored ...

We get to choose our protection ...

Shooters 2013!

GRAPHICS - Our articulated avatars will be detailed and well-modeled & the behaviors so realistic that it will be difficult to tell if they are live or if they autonomous characters ...



We will be able to shoot a hole into anything and the shards will be like the shards of reality ...



Shooters 2013!

'Net - Our demand will be for premium Quality of Service and we will insist on minimal lag.



- We will have entity streams for large numbers of players and audio streams from nearby players.
- And maybe video streams for offline chat ...

We will model the world to a degree such that we can interact with almost anything in any way ...



Shooters 2013!

*EXPERIENCE - fear,
comradery, excitement,
sweaty palms, the entire
gamut.*



ExtremeSports 2015!

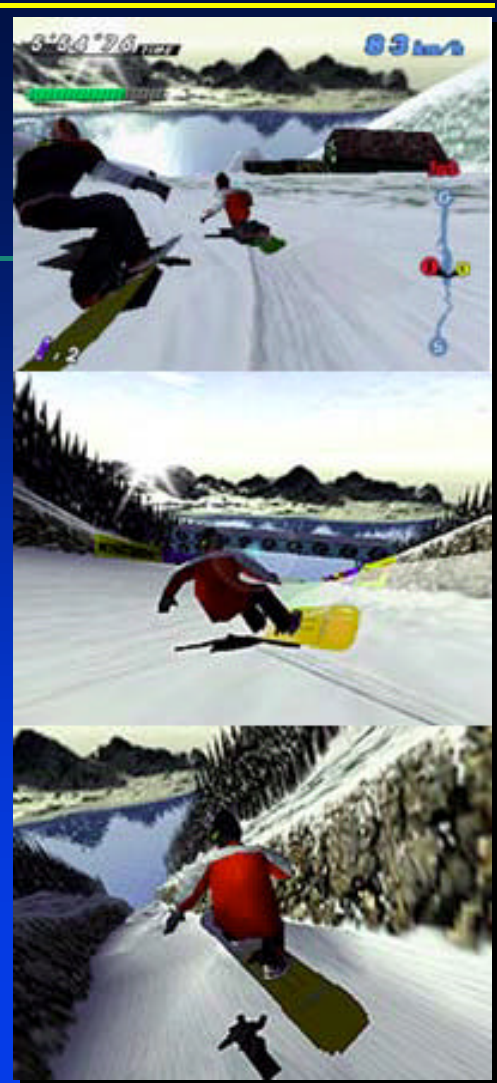
INTERACTIVITY -

*Imagine the view from
the wrestler we will have
and the thuds against our
body as we perform
ExtremeSports from the
safety of our VR room.*



ExtremeSports 2015!

***GRAPHICS - Our worlds
will be rich in surface
detail and there will not
be a missed mogul in its
depiction.***



ExtremeSports 2015!

*'Net - The lag on our
'Net will be so low that
we will be able to perform
the most delicate motion.*

*EXPERIENCE - We will
be Pele ...*



NPSNET

MartialArts Forever!

***INTERACTIVITY -
the tracking of our
body movements in
the VR cell will allow
us to practice moves
against fearsome
opponents ...***



MartialArts Forever!

GRAPHICS - the human avatars will be incredibly detailed, with each articulation smooth and the skin textures real.



MartialArts Forever!

*'Net - lag will be near
zero as our Quality of
Service is set to Premium.
We will feel that fist
from Washington, DC' ...*



NPSNET

MartialArts Forever!

***EXPERIENCE -
we will be in
touch with our
inner soldier and
those out on the
'Net too ...***



VR Sex

***INTERACTIVITY - what
is the input & the output
device?***



VR Sex

GRAPHICS - *yes, very, very important ...*

'Net - *reach out and touch someone ...*

EXPERIENCE - *yes, whatever ...*



VR Sex

OK, enough of that but sex was the driver behind the success of videotape in the home & is a big driver of the Internet ...



**So if we want to be able to do
all this, what do we need?**



Hardware, network, software, input devices ...

- ***Compute power - as many cycles as we can get for under \$700. 1,000Mhz+ (300Ghz by 2015?)5?)***
- ***Graphics - we are seeing boards that run 44M polygons per second and 1B textured pixels filled per second as announcements from chip manufacturers. We will have 200M+ textured polygons per second in three years.***



Network

We are seeing high-speed nets to the home ...

- *You can easily buy DSL now and get 1.5Mbps downstream and 384Kbps back.*
 - *I can interact with 500 players in a game AND have a video stream to my home with such a speed.*
 - *My home can do 7Mbps to the Internet with DSL!*



Network

Cable modems?

- *These are being deployed more rapidly and the promised speeds are GREAT but the shared nature of the LAN for some areas is distributing poor performance across a large number of users ...*
 - *If we could keep the speeds up per household, then we can support games of 4,000 players and a video stream to the home (10Mbps)!*



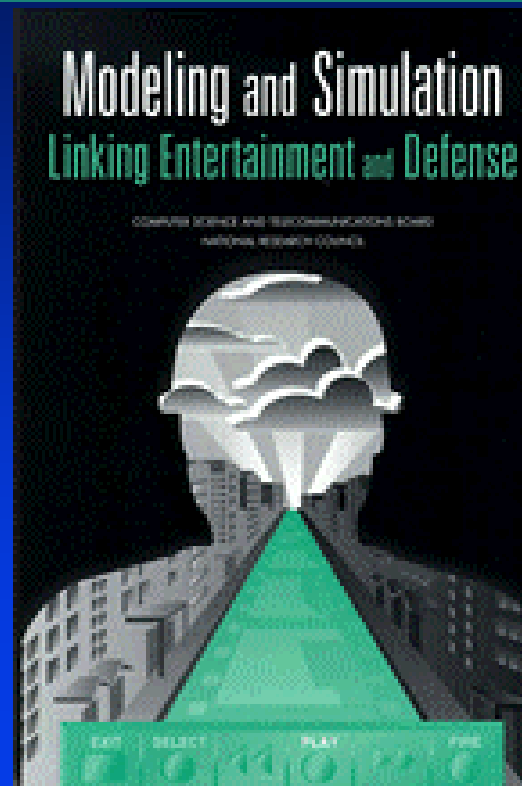
Network

Latency - must be less than 100ms for high interactivity, maybe 200ms for some gaming apps.

Additional technical requirements

We do not just have graphics & networking requirements.

- *We have some pretty stiff software and hardware R&D that remains to be done for our future interactive entertainment systems ...*



A Research Agenda

Networked Virtual Environments

Standards for Interoperability

Technologies for Immersion

Computer Generated Characters

Tools for Creating Simulated Environments

Networked Virtual Environments - A Vision



Eventually, there will exist a persistent virtual environment simultaneously shared by billions.

There can never be a global reboot.

All modifications must happen on the fly.

Requirements for that Vision - Network Software Architecture



Extensible/Composable/Interoperable

- *Bamboo*
- *Dynamic Protocols*

Suspend/Resume State

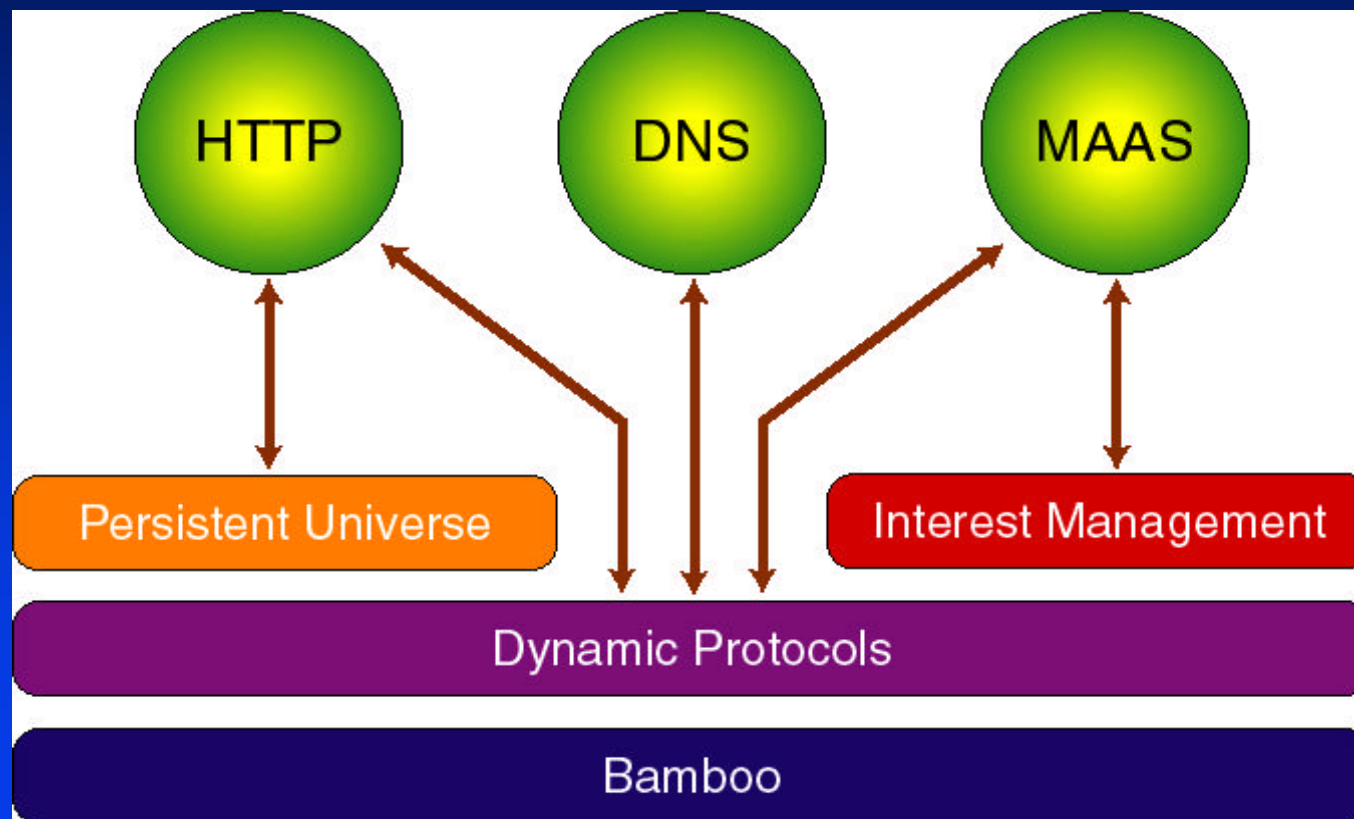
- *Persistent Universe*

Large- Scale // Infinite Players

- *Interest Management*

NPSNET

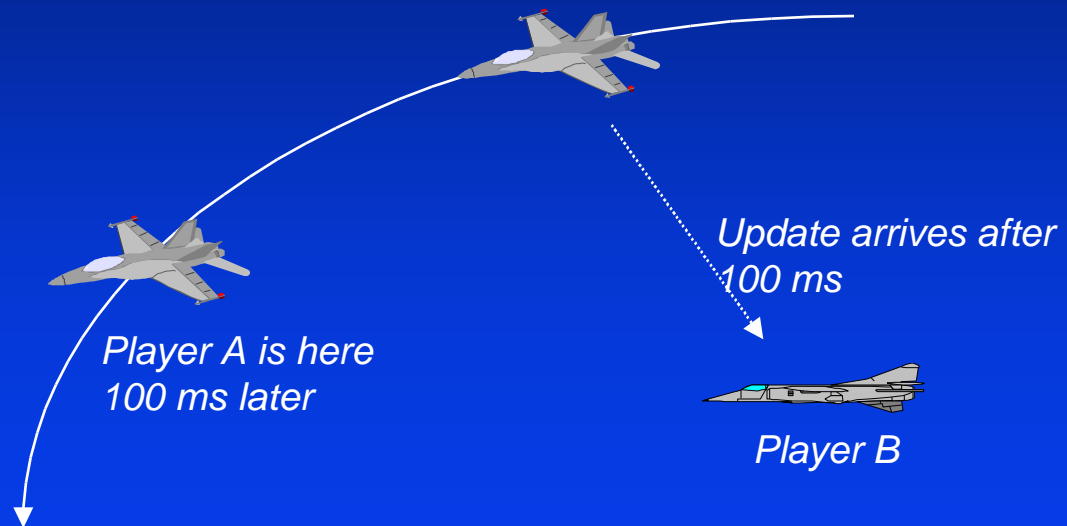
Net- VEs - The NSA Big Picture



Networked Virtual Environments - Latency!



- ***Latency-reduction - techniques for reducing the true or perceived latency in distributed simulations.***



Standards for Interoperability

We must be designing standards for interoperability that are as simple to use as writing a web page ...

Technologies for Immersion

Image generation - real-time, graphics computers capable of generating complex visual images.

- ***1,000Mhz to 300Ghz clock rates.***
- ***200M+ textured polygon/second range, 1B pixels filled per second.***
- ***GBs of on-board memory.***
- ***Handheld, wireless ...***



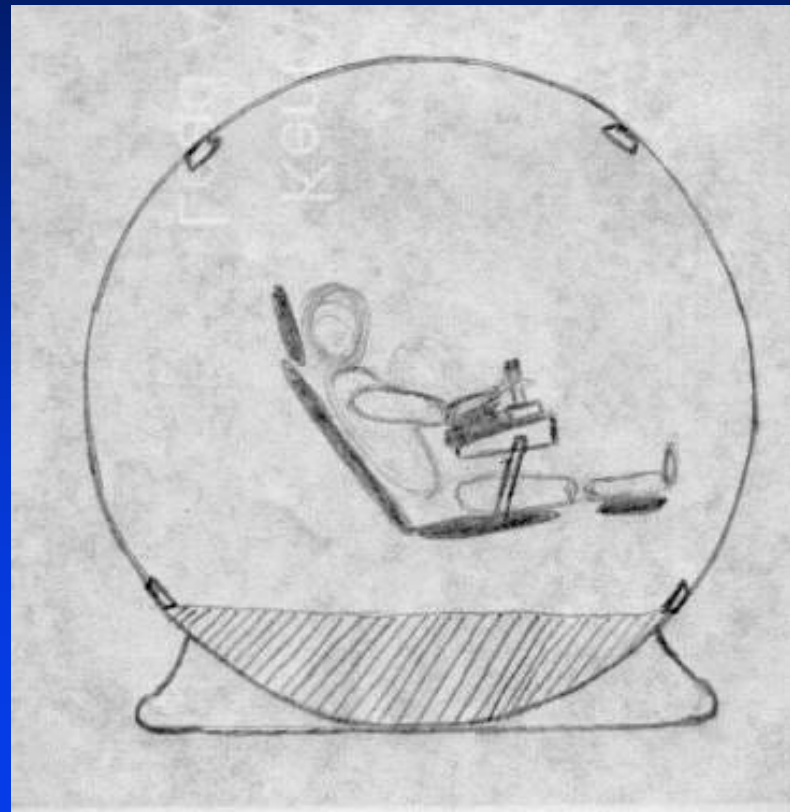
Technologies for Immersion



***Tracking -
technologies for
keeping track of
human participants
in virtual
environments.***

Technologies for Immersion

Full sensory interfaces - technologies for providing a wide range of sensory stimuli: visual, auditory, olfactory, and haptic.



Technologies for Immersion

NPSNET



Locomotion - technologies that allow participants to walk through virtual environments while experiencing hills, bumps, obstructions, etc.

Computer- Generated Characters

Want

- *Adaptability - modify behavior automatically*
- *Learning - modify behavior over time*
- *Agent- based*
- *Behavior modeling & Story modeling*
- *Avatars*

Tools for Creating Simulated Environments



Want

- *Database generation and manipulation*
- *Multi-source Compositing*
- *Interactive tools with non-WIMP interfaces*

Really Stop Now!!!

Any questions?

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